Thank you for purchasing this Esco Fume Scrubber. Please read this manual thoroughly to familiarize yourself with the many unique features and exciting innovations we have built into your new equipment. Esco provides many other resources at our website, www.escoglobal.com, to complement this manual and help you enjoy many years of productive and safe use of your Esco products.

User Manual

EnviroSafe

Fume Scrubber

For Technical Service, contact
North America
Esco Technologies, Inc.
2940 Turnpike Drive, Units 15-16 • Hatboro, PA 19040, USA
Toll-Free USA and Canada 1-877-479-3726
Tel 215-441-9661 • Fax 215-441-9660
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Esco EFS User Manual
Version A - Released May 2011

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"Material in this manual is provided for informational purposes only. The contents and the product described in this manual (including any appendix, addendum, attachment or inclusion), are subject to change without notice. Esco makes no representations or warranties as to the accuracy of the information contained in this manual. In no event shall Esco be held liable for any damages, direct or consequential, arising out of or related to the use of this manual."

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APPENDIX

Warranty Terms and Conditions

Esco products come with either a 1, 2 or 3 year limited warranty, depending on the product purchased, beginning on the date of shipment from any Esco international warehousing location. To determine which warranty applies to your product, refer to the appendix below.

Esco's limited warranty covers defects in materials and workmanship. Esco's liability under this limited warranty shall be, at our option, to repair or replace any defective parts of the equipment, provided if proven to the satisfaction of Esco that these parts were defective at the time of being sold, and that all defective parts shall be returned, properly identified with a Return Authorization.

This limited warranty covers parts only, and not transportation/insurance charges.

This limited warranty does not cover:

- Freight or installation (inside delivery handling) damage. If your product was damaged in transit, you must file a claim directly with the freight carrier.
- Products with missing or defaced serial numbers.
- Products for which Esco has not received payment.
- Problems that result from:
    - External causes such as accident, abuse, misuse, problems with electrical power, improper operating environmental conditions.
    - Servicing not authorized by Esco.
    - Usage that is not in accordance with product instructions.
    - Failure to follow the product instructions.
    - Failure to perform preventive maintenance.
    - Problems caused by using accessories, parts, or components not supplied by Esco.
    - Damage by fire, floods, or acts of God.
    - Customer modifications to the product
- Consumables such as filters (HEPA, ULPA, carbon, pre-filters) and fluorescent / UV bulbs.
- Esco is not liable for any damage incurred on the objects used on or stored in Esco equipment. If the objects are highly valuable, user is advised to have in place independent external preventive measures such as connection to a centralized alarm system.

Factory installed, customer specified equipment or accessories are warranted only to the extent guaranteed by the original manufacturer. The customer agrees that in relation to these products purchased through Esco, our limited warranty shall not apply and the original manufacturer's warranty shall be the sole warranty in respect of these products. The customer shall utilize that warranty for the support of such products and in any event not look to Esco for such warranty support.

Esco encourages all users to register their equipment online at www.escoglobal.com/warranty or complete the warranty registration form included with each product.

ALL EXPRESS AND IMPLIED WARRANTIES FOR THE PRODUCT, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES AND CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED IN TIME TO THE TERM OF THIS LIMITED WARRANTY. NO WARRANTIES, WHETHER EXPRESS OR IMPLIED, WILL APPLY AFTER THE LIMITED WARRANTY PERIOD HAS EXPIRED. ESCO DOES NOT ACCEPT LIABILITY BEYOND THE REMEDIES PROVIDED FOR IN THIS LIMITED WARRANTY OR FOR SPECIAL, INDIRECT, CONSEQUENTIAL OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, ANY LIABILITY FOR THIRD-PARTY CLAIMS AGAINST YOU FOR DAMAGES, FOR PRODUCTS NOT BEING AVAILABLE FOR USE, OR FOR LOST WORK. ESCO'S LIABILITY WILL BE NO MORE THAN THE AMOUNT YOU PAID FOR THE PRODUCT THAT IS THE SUBJECT OF A CLAIM. THIS IS THE MAXIMUM AMOUNT FOR WHICH ESCO IS RESPONSIBLE.

These Terms and Conditions shall be governed by and construed in accordance with the laws of Singapore and shall be subject to the exclusive jurisdiction of the courts of Singapore.

Technical Support, Warranty Service Contacts
USA: 1-877-479-3726
Singapore: +65 65420833
Global Email Helpdesk: support@escoglobal.com
Visit http://www.escoglobal.com/ to talk to a Live Support Representative
Distributors are encouraged to visit the Distributor Intranet for self-help materials.

Product Appendix, Warranty Listings

Biological Safety Cabinets, Laminar Flow Cabinets, HEPA-Filtered Cabinets (except Streamline brand)	The warranty periods for BSC may vary by country. Contact your local distributor for specific warranty details.
Laboratory Fume Hoods	2 years limited.
Ductless Fume Hoods	4 years limited for Ascent Opti, 6 years for Ascent Max.
Cleanroom Equipment	1 year limited.
Laboratory Ovens and Incubators	1 year limited.
CO_2 Incubators	2 years limited.
Containment/Pharma Products	2 years limited.
Ultralow Temperature Freezer	3 years limited. 60 months on Compressor.

The warranty period starts two months from the date your equipment is shipped from Esco facility for international distributors. This allows shipping time so the warranty will go into effect at approximately the same time the equipment is delivered to the user. The warranty protection extends to any subsequent owner during the warranty period. Distributors who stock Esco equipment are allowed an additional four months for delivery and installation, providing the product is registered with Esco. User can register product online at www.escoglobal.com/warranty or complete the warranty registration form included with each product.

Policy updated on 1st December 2011 (This limited warranty policy applies to products purchased on or after 1st January 2012)

Introduction

1. Products Covered

Esco EnviroSafe Fume Scrubber	
Electrical Rating	Model
230 V AC, 50/60 Hz, 1Φ	EFS

2. Safety Warning

- Anyone working with, on or around this equipment should read this manual. Failure to read, understand and follow the instructions given in this documentation may result in damage to the unit, injury to operating personnel, and / or poor equipment performance.
- Any internal adjustment, modification or maintenance to this equipment must be undertaken by qualified service personnel.
- The use of any hazardous materials in this equipment must be monitored by an industrial hygienist, safety officer or some other suitably qualified individual.
- Before you process, you should thoroughly understand the installation procedures and take note of the environmental / electrical requirements.
- In this manual, important safety related points will be marked with the symbol.
- If the equipment is used in a manner not specified by this manual, the protection provided by this equipment may be impaired.

3. Limitation of Liability

The disposal and / or emission of substances used in connection with this equipment may be governed by various local regulations. Familiarization and compliance with any such regulations are the sole responsibility of the users. Esco's liability is limited with respect to user compliance with such regulations.

4. European Union Directive on WEEE and RoHS

The European Union has issued two directives:

• Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE)

This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. It is marked with the following symbol:

Esco sells products through distributors throughout Europe. Contact your local Esco distributor for recycling/disposal.

• Directive 2002/95/EC on Restriction on the use of Hazardous Substances (RoHS)

With respect to the directive on RoHS, please note that this hood falls under category 8 (medical devices) and category 9 (monitoring and control instruments) and is therefore exempted from requirement to comply with the provisions of this directive.

Declaration of Conformation

In accordance to EN ISO/IEC 17050-1:2010

We, Esco Micro Pte. Ltd.
of 21 Changi South Street 1
Singapore, 486777
Tel: +65 6542 0833
Fax: +65 6542 6920

declare on our sole responsibility that the product:

Category : Fume Scrubber
Brand : EnviroSafe
Model : EFS

in accordance with the following directives:

2006/95/EEC : The Low Voltage Directive and its amending directives
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Policy updated on 12th Apr 2011 (This limited warranty policy does not apply to products purchased before 12th Apr 2011)

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EMC : EN 61326-1:2006 Class B

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XQ Lin
Group CEO, Esco

This Declaration of Conformity is only applicable for 230V AC 50Hz units

Chapter 1 - Product Information

1.1 About EnviroSafe Fume Scrubbers

Esco fume scrubbers (EFS) are optimally designed to provide effective air pollution control and laboratory personnel safety protection for ducted fume hoods. This is especially important laboratories and industries that use strong acid and alkali in their daily activities.

EFS(s) are designed to be easily installed on top of Esco's Frontier Acela series fume hoods (EFA, EFF, EFI, EFQ, EFP).

The chemical fumes exhausted by the fume hood(s) are filtered by the first layer of the demister layer (the green filter). This will ensure that the larger size chemical molecules trapped and wash away with the water.

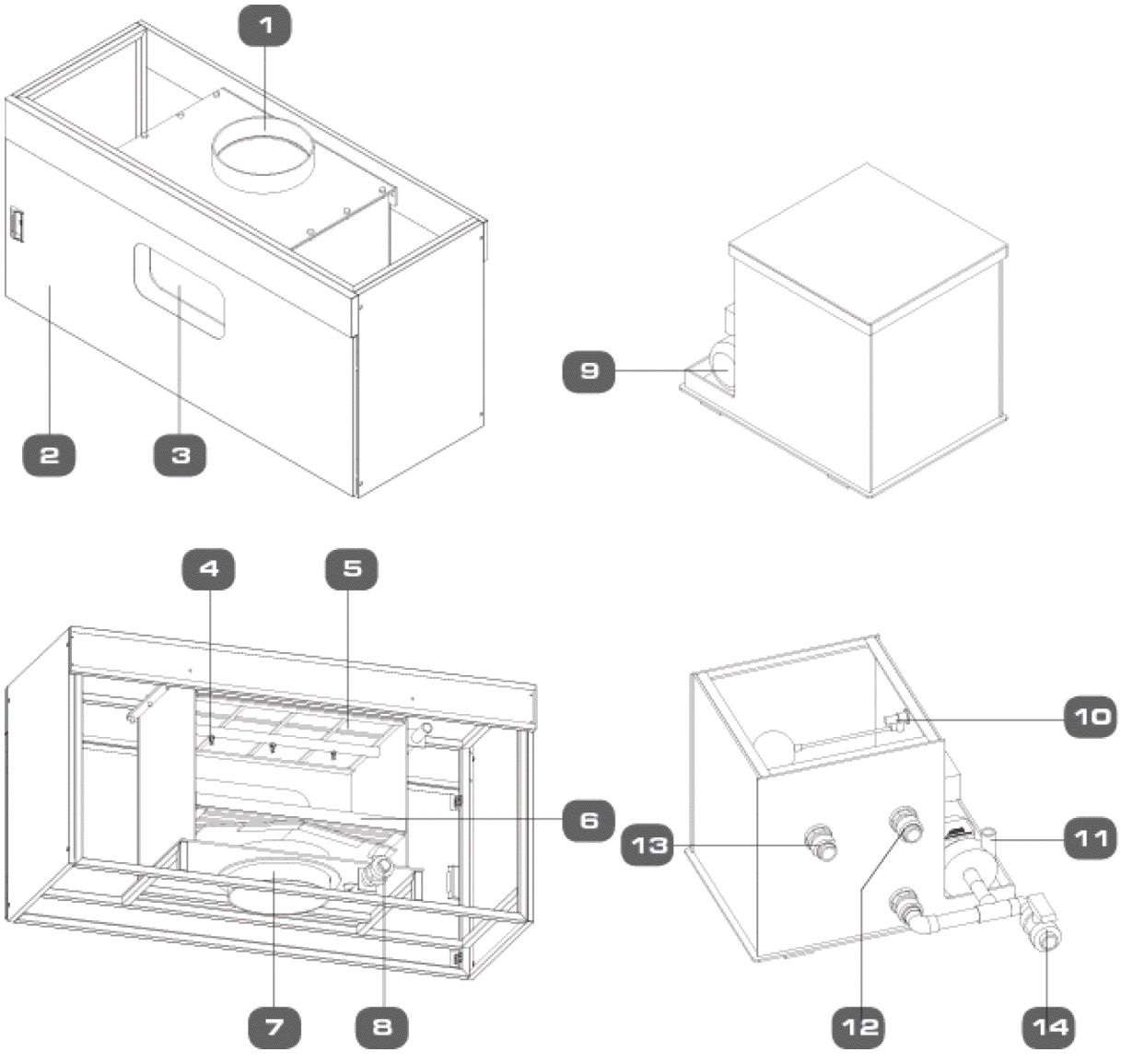
In the chamber, water or a suitable neutralizing liquid agent is constantly being sprayed at incoming fumes through a series of spray nozzles. The water molecules bond with the chemical fumes trapping them before they can be exhausted through the second demister layer.

The scrubbing efficiency is further enhanced with the use of telleretes or scrubbing media. Telleretes are high efficiency packings that provide more surface area with higher liquid surface available for the gas and liquid phase. These packings are non-wetting and with high mass transfers, provide high absorption efficiency.

A second layer demister trapped the water molecule in the chamber, minimizing water loss in the scrubber system and ensuring a clean, chemical free exhaust air.

The water in the chamber is drained to the main tank, located in the fume hood’s base cabinet.

1.2 Quick View



1. Exhaust collar
2. Door window
3. Viewing window to see inside scrubber chamber
4. Spray nozzles for spray water from main tank
5. Demister mist eliminator use for the removal of entrained material in vapor flow
6. Scrubbing media (tellerettes) provides maximum surface contact between the gas and the scrubbing liquid by facilitating continuous formation of droplets throughout the packed bed
7. Inlet collar
8. Pipe drain for distribute the waste water in scrubber chamber
9. Chemical pump with capacity : 80 l/min (max), rate head : 6 m, connection : Ø1” Motor : 0.3kW, 220V/1ph/ 50Hz, 2 Pole TEFC
10. Floating switch for fresh water height limit
11. Discharge water from pump is transported to scrubber through piping
12. Water overflow outlet
13. Inlet liquid from scrubber chamber, drip cup sink and wash down system
14. Drain pipe

Chapter 2 - Operating the Scrubber

2.1 Starting the Scrubber

1. Fill the water tank with clean water
2. Turn on the pump by connecting it to the main power source
3. Allow 1 minute for the pump to start. Once the pump start, it won't be long until the sprays of water can be seen through the scrubber window (in some cases, it may take a few moments for the pump to be able to fully charge the scrubber system piping with water).
4. The scrubber is ready for operation

2.2 Stopping the Scrubber

1. Turn off the pump by disconnecting it from the main power source
2. Allow a few minutes for the water to exit the scrubber chamber and drained to the tank.
3. Empty the tank by opening the drain valve

Chapter 3 -Maintenance

3.1 Scheduled Maintenance

Proper and timely maintenance is crucial for trouble free functioning of any device and your Esco fume hood is no exception to this rule. We strongly recommend that you follow the maintenance schedule suggested hereunder in order to obtain optimal performance from your Esco fume hood.

No.	Description of Task to Perform	Maintenance to be carried out every				
		Day	Month	6 Months	1 Year	As Needed
1	Check/change water in the water tank	√				
2	Clean scrubber's exterior		√			
3	Check the sprayer's nozzle in the scrubber chamber			√		
4	Check pump (pump maintenance)				√	
5	Check piping				√	
6	Replace demisters					√
7	Replace telleretes					√

Cleaning the scrubber

- Use a damp cloth to clean the exterior surface of the scrubber
- Use clean water to finish the cleaning and wash away any residue of disinfectant agent and soapy water
- To neutralize the environment in the scrubber chamber, do scrubbing procedure with only clean water for 30 minutes twice.

3.2 Maintenance/Service Log

It is good practice (and in some cases regulatory requirement) to maintain a log of all maintenance work carried out on your cabinet.

APPENDIX

LOG RECORD

Fume Hood : _____
Serial Number : _____
Person in Charge : _____

1. This log record should be used by the operator to record any new chemicals that has been introduced to the fume hood during its operation, problems encountered, etc.
2. Please also record any major maintenance procedure performed by the service technician, for example: parts replacement, recertification, etc.

Date	Event	User Signature	Supervisor Signature

In case of emergencies, please call:
Name : _____
Cell Phone Number : _____
E-mail : _____

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